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DISAGREEMENT AND LEARNING ABOUT REFORMS

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Abstract

When it comes to economic reforms in developing countries, many economists agree on broad objectives (such as fostering outward orientation). Broad objectives, however, can be pursued in many different ways, and policy experimentation is often indispensable for learning which alternative works locally. We propose a simple model to study this societal learning process. The model explores the role of disagreeing beliefs about “what works”. It suggests that this type of disagreement can stall the societal learning process and cause economic stagnation. Interestingly, this can happen even if everybody knows that Pareto-improving reforms do exist. Our analysis is motivated by the empirical observation of a negative relationship between disagreement and economic growth among poorer countries.

JEL classification: D72, D78, D83, O11

Keywords: Disagreement, experimentation, societal learning, development policy, gridlock

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1 Introduction

There is little disagreement when it comes to the broad objectives of important economic reforms in developing countries. Many economists think that growth rates in poor places can be improved by strengthening the security of property rights, market-oriented incentives, and outward orientation. However, as ever, the devil lies in the detail. A particular objective can be approached in many different ways. For instance, as highlighted by Rodrik (2008), outward orientation can be promoted through import liberalization, by paying export subsidies, or by establishing export-processing zones. What is more, the nature of the “most appropriate” reform policy is often highly context-specific, i.e., depends on the existing institutional framework (e.g., Commission on Growth and Development, 2008; Rodrik, 2010). For instance, export subsidies might be the appropriate choice if the financial system fails to funnel credit to the most competitive firms (while, under these circumstances, a policy of rapid import liberalization might be ineffective or even harmful for total factor productivity). On the other hand, import liberalization might be the successful approach if credit markets manage to allocate capital quite efficiently (while, in such a situation, the introduction of an export-subsidy scheme might have little or even a negative overall impact on productivity).

The contextual nature of the policy-reform process entails that there is often substantial ambiguity as to which reform measures work and which ones are more likely to be ineffective or even harmful.¹ Clearly, this ambiguity also fosters disagreement about appropriate reform plans (Rodrik, 2010). From the point of view of an impartial “planner”, policy experimentation is often instrumental for learning about what works and what does not.² However, as a matter of fact, people, policy makers, and experts alike often hold strong and opposing opinions about appropriate reforms (Rodrik, 2010). This can interfere with a society’s propensity to experiment. The more some segments of society are convinced that a particular reform proposal is misguided anyway, the more inclined they will be to spend resources to block the approval or implementation of that reform. As a result, there may be little experimentation and little learning about which specific reform measures work. In this paper, we develop a simple theoretical model to systematically explore the consequences of disagreeing beliefs for policy experimentation, societal learning, and economic development.

¹This ambiguity is reflected in a statement by Lee Kuan Yew, the former Prime Minister of Singapore who initiated sweeping economic reforms. He writes: “I started out with great trepidation on a journey along an unmarked road to an unknown destination.” (Commission on Growth and Development, 2008, p. 29.)

²Some scholars (e.g., Heilmann, 2008; Rodrik, 2010; Xu, 2011) argue that policy experimentation played a crucial role in China’s economic rise. Similarly, many successful East Asian countries (e.g., South Korea, Taiwan) tried out unconventional and tailor-made trade policies to integrate with the world economy.

It has been common among economists to relate disagreement about alternative reform policies to conflicts of interest. However, Saint-Paul (2010) forcefully argues that this provides an incomplete account of reality:

In most situations the reform process is associated with a *debate* and the debate is about what the economic effects of the reform are and how the mechanisms underlying those effects work. People disagree not only because their net gains differ but also because they have a different understanding of how the reform works. This aspect is typically neglected in our analysis which assumes that all agents use a single, objective model – the correct model of the economy – to compute their gains and losses. If this were true, there would not need to be a debate. But in real-world situations the reform is heavily discussed because there is disagreement on how it will work. (p. 325)

The literature has established several sources of such genuine disagreement. Sethi and Yildiz (2012), for instance, show that persistent disagreement arises in fragmented or segregated societies where individuals do not observe other individuals’ priors or where they only observe the priors of individuals within their own social group. Suen (2004) shows that there can even be a rationally induced demand for information from like-minded sources. Psychological explanations of disagreement highlight the role of overconfidence and that people tend to estimate the precision of their own beliefs higher than of others’ beliefs (e.g., Alpert and Raiffa, 1982; Malmendier and Tate, 2005; Andreoni and Mylovanov, 2012).³ In this paper, we take the existence of initial disagreement as given. We do assume, however, that people learn accurately from reform experiences so that disagreement may weaken over time.

In our model, there are two political actors, an incumbent and an opposition. The incumbent is in control of the executive and may propose a specific reform policy. This reform policy is implemented unless the opposition puts in its veto, in which case the inherited default policy remains in force. Vetoing a proposed policy is costly, and we take the magnitude of this cost as a measure of the executive’s strength. The incumbent can choose among two alternative reforms. One alternative is successful, whereas the other one is harmful. From the perspective

³Interestingly, Rodrik (2010) himself alludes to psychological factors behind disagreeing beliefs: “Researchers and academics ... have to resist the temptation to substitute prepackaged solutions for nuance and skepticism. The record suggests they have not always been very good at this. Despite their scientific demeanor, economists are subject to the same cognitive biases as others: overconfidence, tendency to join the herd, and proclivity to overlook contradictory evidence. As a consequence, too often they become associated with (and promoters of) universal blueprints only loosely grounded in theory and evidence.” (p. 40)

of an impartial observer, there is a high degree of uncertainty about which is the successful one. However, the political actors hold non-neutral and disagreeing prior beliefs in this regard, implying that each group perceives the other group’s favorite reform as harmful. The implementation of any of these two reforms, and the subsequent observation of the aggregate output, allows the two actors to update their beliefs. However, uncertainty is not completely eliminated because the economy is subject to confounding exogenous shocks.

We show that in such an environment the reform process may come to a complete standstill. This can happen even though everybody knows that a Pareto-improving reform does exist. To see why, consider the situation of the opposition. The opposition believes that the reform favored by the incumbent is harmful and hence certainly costly in the short term. Moreover, from the opposition’s perspective, the incumbent will update its belief about what works only insufficiently after the implementation of its proposal. Specifically, after observing the output, the incumbent may stick to the initial policy even if – in the opposition’s view – the news is not good and would mandate a reversal of the reform. This low propensity to revisit past reforms is anticipated by the opposition. It may therefore expect a negative overall payoff from experimentation and hence incur the cost of a veto to save the status quo.

Such a “gridlock equilibrium” leads to economic stagnation and emerges whenever exogenous shocks are sufficiently big and the executive is sufficiently weak. The model therefore offers a new perspective on the lack of sustained growth in parts of the developing world, where it is common that economies are exposed to big exogenous shocks (because they specialize in volatile sectors – see, e.g., Koren and Tenreyro, 2007) and where executives tend to be weak (because of low bureaucratic capacity – see, e.g., Rauch and Evans, 2000). Our model further predicts that a higher degree of disagreement reduces economic growth. Using data on political attitudes from the World Value Survey, we document the existence of such a negative correlation in a cross-section of 58 developing and emerging economies.

Although the importance of the experimental approach to development policy has been advocated for a while (e.g., North, 1990; Roland, 2000; Mukand and Rodrik, 2005), there is relatively little theoretical work on societal learning through experimentation. Majumdar and Mukand (2004) show that, because of reputation concerns, politicians may have incentives to go along with reforms even if the latter have turned out to be inappropriate. In other cases, politicians may be excessively conservative about experimenting. Mukand and Rodrik (2005) consider a setup in which successful reform policies are specific to local conditions. Politicians can either copy reforms that were successful elsewhere, or they can engage in a discovery process about what works locally. The basic trade-off between these choices is that

policies copied from other countries may not be adapted to local circumstances, while local experimentation provides scope for corrupt behavior. Hausmann and Rodrik (2003) consider the case of a country that needs to learn what it is good at producing. None of these papers, however, considers the effects of disagreement about the prospects of a reform.⁴

On a broader level, this paper is related to different strands of literature on societal or social learning. In macroeconomics and finance, contributions to the learning literature typically assume that individuals do not perfectly know the structure of the economy and/or do not form rational expectations (see, e.g., Evans and Honkapohja, 2011, for a recent survey). However, this literature is mainly focused on monetary policy or phenomena like asset bubbles. Another strand of the learning literature takes a more microeconomic perspective and explores social learning from, e.g., neighbors about new agricultural technologies (e.g., Foster and Rosenzweig, 1995; Munshi, 2004; Conley and Udry, 2010). With this literature, we share the focus on developing countries; however, our analysis is at a more aggregate level, focusing on economic policy and the role of disagreeing beliefs about what policies work.

The rest of the paper is organized as follows. The next section presents some evidence on disagreement and economic growth. Section 3 introduces the basic model. In Section 4, we solve the model and discuss the factors determining whether an “experimentation” or a “gridlock” equilibrium emerges. Section 5 focuses on growth and Section 6 concludes.

2 Motivating Evidence

How does disagreement about key economic reforms relate to long-run economic performance? This section presents some motivating evidence in this regard. Relying on a cross section of 58 developing and emerging economies, we document a remarkably strong negative correlation between disagreement and economic growth in the 1980-2009 period.

Following Lindqvist and Östling (2010), our measure of disagreeing beliefs is based on four attitude questions from the World Value Survey. The four questions investigate people’s broad attitudes towards income inequality, the role of the government, and economic competition. More specifically, people are confronted with four polar statements (which are listed in Table 1, Panel A) and then asked how much they agree or disagree with each of these statements (on a 1-10 scale). To obtain a proxy for disagreeing beliefs at the country level, we calculate the standard deviations of the answers separately for each of the four questions, using as many

⁴Somewhat relatedly, the literature on institutional design (e.g., Aghion, Alesina, and Trebbi, 2004) investigates the optimal degree of insulation of a leader, i.e., the share of votes that can block a leader when he tries to implement legislation. This literature, however, is not concerned with societal learning.

years as are available from the 1980-2009 period. These standard deviations are then averaged (by country) across the four questions. A high average is taken as a (crude) proxy for strongly disagreeing beliefs about the nature of appropriate economic reforms.

Economic performance is measured by the average annual growth rate of GDP p.c. (PPP, in constant 2005 I\$) over the 1980-2009 period. To account for the possibility that our disagreement measure may partly reflect heterogeneity in terms of income or culture, we control for two additional variables that are known to correlate with growth. These are the Gini index of the income distribution (averaged over the 1980-2009 period), and a standard index of ethnolinguistic fractionalization.⁵ We focus on countries that are not among founding members of the OECD. For 58 of these countries (listed in Table 1, Panel B), the required data is available.

Table 1 here

The main empirical pattern is presented in Figure 1. The figure shows a partial regression plot, illustrating a negative correlation between average annual GDP p.c. growth (residuals) and disagreement about economic policies.⁶ The estimated coefficient on disagreement (which is the slope of the fitted line in the figure) is -0.016 (p -value: 0.053), implying that an increase in disagreement from the 10th to the 90th percentile is associated with a fall in annual GDP p.c. growth of 1.29 percentage points. This is a sizable correlation, considering the fact that the 90th-to-10th-percentile difference in the annual growth rate is just 3.96 percentage points. The correlation between the two variables is also quite robust: Its magnitude is unchanged when we leave out the Gini index, or the index of ethnolinguistic fractionalization, or both; at the same time, the estimate turns significant at the 1%-level in all these cases.

Figure 1 here

Obviously, we cannot draw strong conclusions from Figure 1. Our data is purely cross-sectional and the proxy for disagreeing beliefs is relatively indirect. However, the figure does call attention to the fact that there is a robust negative relationship between economic growth and disagreement about key economic policies in a cross-section of poorer economies. We find this negative relationship although we control for income inequality and ethnolinguistic fractionalization. The theory we develop below offers an explanation for this correlation.

⁵The data on GDP p.c. and income inequality comes from the World Development Indicators. Our measure of ethnolinguistic fractionalization is the ELF(15) index provided by Desmet et al. (2012).

⁶The underlying OLS regression relates average annual GDP p.c. growth to: a constant (0.1364***); our measure of disagreement (-0.01578^*); the Gini index of the income distribution (-0.0001); the index of ethnolinguistic fractionalization (-0.0168^{***}); and the log GDP p.c. in 1980 (-0.0075^{***}). Point estimates are given in parenthesis. Significance at the 1%- and 10%-level is indicated by *** and *, respectively.

3 The Model

3.1 Agents, Preferences, and Technologies

We consider a two-period economy that is populated by a continuum of individuals of mass one. There are two groups of individuals that differ in their beliefs regarding the impact of alternative economic policies (as is discussed below), but are identical in all other dimensions. The groups are dubbed *left* and *right*, and are indexed by L and R .

Each individual derives utility from consumption of the single (non-storable) output good that is produced in the economy. Overall utility is given by

$$U_i = x_{i,0} + \beta x_{i,1}, \quad (1)$$

where $x_{i,t}$ refers to consumption of a representative member of group $i \in \{L, R\}$ in period $t \in \{0, 1\}$ and $\beta > 0$ reflects the importance of second-period consumption.

All individuals have access to a uniform technology which generates a period income of

$$Y_t = A + \Pi_t a + \sigma \epsilon_t$$

units of the output good. In the above equation, A is the non-random part of the period income; $a \in \{-\theta, \theta\}$ stands for an unobserved binary random variable that materializes before the economy starts and remains constant over time; Π_t refers to the economic policy implemented in period t ; ϵ_t represents an exogenous shock which is independent of a and distributed according to a standard normal distribution; $\sigma \geq 0$ is a constant that scales the variance of the disturbance term.⁷ Since none of our results depends on A , we normalize it to zero, such that

$$Y_t = \Pi_t a + \sigma \epsilon_t. \quad (2)$$

At the end of each period, all individuals observe Y_t but neither a nor ϵ_t . The ex ante probability of $a = -\theta$ is denoted by p . As we will discuss below, the two groups, L and R , hold disagreeing beliefs about the value of p .

3.2 Policies and the Political Process

Policies. There are three different policy options, $\Pi_t \in \{-1, 0, 1\}$. The middle option, 0, represents the inherited “default policy” in period 0, whereas both -1 and 1 are “reform

⁷For analytical convenience, we allow ϵ and hence Y to take on values on the entire real line. Alternatively, we could define output as e^Y . This approach would guarantee strictly positive output levels, but would also complicate the analysis without leading to any additional insights.

policies”. We refer to policy -1 as the *left* reform policy, and to policy 1 as the *right* reform policy (without any political connotation). Clearly, whether or not a given reform (i.e., a deviation from the default policy) improves or impairs economic performance depends on the unobserved realization of $a \in \{-\theta, \theta\}$. For instance, if a were equal to $-\theta$, option -1 would represent a successful reform while the alternative would be a failure.

In practice, governments concerned with reforms are often confronted with such situations. For instance, as discussed in the introduction, a government concerned with outward orientation might have to choose between import liberalization and export subsidies without exactly knowing which of the two measures is the appropriate one under local circumstances. Another example would be the reform of credit-market institutions. Suppose that a developing-country government has to choose between investing in contract-enforcement institutions (i.e., the court system) or in information institutions (i.e., credit registries). This is not an obvious choice because, according to the huge literature on financial imperfections (see, e.g., Banerjee and Duflo, 2010, for an overview), the nature of the successful reform is likely to depend on the importance of relationship lending, a variable that is hard to observe. If relationship lending were rather unimportant, the first option would be likely to improve matters a lot (while the benefits from investing in credit registries might not cover the costs). However, if relationship lending were important, investing in credit registries would be the optimal choice (while investing in law-enforcement institutions might even be harmful).

Political process. In the beginning, “nature” determines which of the two groups is in control of the executive over the entire two periods.⁸ We refer to this group as the incumbent, while the other group is called the opposition. The incumbent proposes a specific policy $\pi_t \in \{-1, 0, 1\}$ in each of the two periods, $t \in \{0, 1\}$. The proposed policy is adopted and implemented unless the opposition puts in its “veto”. More specifically, we assume that the implemented policy is determined according to

$$\Pi_t = \pi_t(1 - v_t) + v_tD_t, \quad (3)$$

where $D_t \in \{-1, 0, 1\}$ stands for the “default policy” and $v_t \in \{0, 1\}$ refers to the decision on the “veto”, with 1 indicating that the proposed policy is blocked. Regarding the default policy, we have $D_0 = 0$. Furthermore, today’s policy choice is tomorrow’s default policy:

$$D_{t+1} = \Pi_t. \quad (4)$$

⁸Note that we do not consider a change in the control of the executive between the two periods. Rather, the two periods 0 and 1 should be interpreted as two sub-periods constituting a full legislative term.

Blocking a reform is costly. For the opposition, a veto is associated with expenses of $c_t \geq 0$ units of output. In what follows, we take this cost to reflect the incumbent’s executive strength: If a veto is expensive, the incumbent is strong because it takes much effort to prevent a proposed policy from taking effect, and vice versa.

In practice, the strength of the executive depends on many factors, both fundamental and time-varying. Executive strength is surely affected by a country’s political institutions. The executive is relatively weak if it is constrained by a powerful system of checks and balances that allows the opposition to delay, dilute, or veto a proposed policy at little effort.⁹ In contrast, if formal checks and balances are weak, the executive is strong since blocking a proposed policy tends to involve costly measures such as organizing strikes or stirring up demonstrations. A further important determinant of executive strength is the capacity of the bureaucracy to implement formally adopted policies. If this capacity is low (e.g., because of ineffective oversight of bureaucrats or lacking human resources), the executive is weak as opposition groups might be able to “throw off course” the implementation of policies at little effort (e.g., by paying modest bribes to key officials).¹⁰ In contrast, if bureaucratic capacity is high, inducing key officials not to comply with reform directives tends to be costly.

Finally, next to these fundamental factors, executive strength may be affected by the history of economic reforms. In practice, reversing a recently implemented reform is a complex endeavor that, among other things, requires a disproportionate effort from the part of the bureaucracy. It is therefore natural to assume that it is comparatively easy to make the bureaucracy undermine a reversal of a previous reform. In our model, this means $c_1 < c_0$ if $\Pi_0 \neq 0$ (and $c_1 = c_0$ otherwise). More specifically, throughout the paper, we assume $c_0 = c \geq 0$ and

$$c_1 = \begin{cases} c & \text{if } \Pi_0 = 0 \\ 0 & \text{if } \Pi_0 \neq 0 \end{cases} . \quad (5)$$

This assumption captures in a simple way the notion that executive strength is reduced if a reversal is attempted. At the same time, focusing on this limiting case simplifies the derivation of the equilibrium. However, as discussed in Appendix B, the model generates similar implications if past reforms do not weaken the executive (and hence $c_1 = c_0$ in all cases).

⁹In the related literature, capturing checks and balances through the presence of veto powers is a usual approach (see, e.g., Diermeier and Myerson, 1999). In practice, systems of checks and balances often involve judicial review of executive/legislative acts or a legislature that consists of two chambers; or that needs to pass important laws with a supermajority; or that may amend policy proposals by the executive.

¹⁰Political scientists (e.g., Huber and McCarty, 2004) have identified low bureaucratic capacity, and the associated susceptibility for corruption, as a major obstacle to the implementation of reforms.

3.3 Beliefs about Reforms

A key assumption in our model is that there is disagreement between groups L and R about the appropriate reform policy. In formal terms, we assume that the groups have heterogeneous priors about p . Members of group L believe that p is equal to $p_L > 1/2$, while members of group R think that $p = p_R < 1/2$. As a result, group L believes that reform policy *left* is more promising than policy *right* (whereas the opposite holds for group R). Note further that our assumptions imply that a priori each group perceives the other group's favorite reform proposal as harmful. While we take the existence of disagreeing prior beliefs as given, we assume that people learn from public information according to Bayes' rule.

Although we do not model the emergence of disagreeing beliefs, it is natural to think that they stem from different exposures to schools of thought or foreign reform experiences. For instance, returning to the example of credit-market reform discussed above, people who were trained that information matters for lending might selectively look at examples of successful introductions of credit registries abroad – and hence may develop a strong belief that these institutions are also key to success at home. On the other hand, people concerned with contract enforcement might focus their attention on successful examples of judicial reforms – and hence get convinced that such reforms are also instrumental to success at home.

3.4 Timing of the Political Game

The timing of the political game is as follows.

- Period 0:
 - Nature determines a (unobserved) and the identity of the incumbent (L or R).
 - The incumbent proposes a policy π_0 .
 - The opposition decides whether or not to veto the proposal, i.e., chooses v_0 .
 - Nature determines Y_0 , and all agents update their beliefs.
- Period 1:
 - The incumbent proposes a policy π_1 .
 - The opposition decides whether or not to veto the proposal, i.e., chooses v_1 .
 - Nature determines Y_1 .

The information structure in this game is such that both groups perfectly know each others' preferences and beliefs, and also observe each others' actions. The only uncertainty concerns nature which determines the underlying state of the world $a \in \{-\theta, \theta\}$ and the disturbance terms ϵ_0, ϵ_1 . However, since nature is not a strategic player, the above game is de facto a dynamic game with complete information. Therefore, it can simply be solved by backward induction. We require players to have beliefs that are consistent with Bayes' law and to correctly anticipate each others' posterior beliefs.

4 Solving the Political Game

In this section, we solve the political game by means of backward induction. Without loss of generality, we henceforth assume that group L is chosen to be the incumbent.

4.1 Second Period

4.1.1 No Policy Reform in $t = 0$ ($\Pi_0 = 0$)

Suppose first that $\Pi_0 = D_1 = 0$. According to equation (3), and because $D_0 = 0$, this situation arises if in $t = 0$ group L has proposed the middle policy option (i.e., $\pi_0 = 0$) or if opposition group R has used its veto (i.e., $v_0 = 1$). Under these circumstances, individuals are not able to update their beliefs with respect to a and hence stick to their priors: Group L continues to think that reform policy *left* is the appropriate one; group R still favors *right*.

Consider now group R 's decision problem. Following group L 's choice of π_1 , group R refrains from using its veto if policies are not proposed to change (i.e., if $\pi_1 = D_1 = 0$) since a veto would be without any effect in this case. Otherwise, if either $\pi_1 = -1$ or $\pi_1 = 1$, group R 's expected consumption in $t = 1$ is given by $p_R\pi_1(-\theta) + (1 - p_R)\pi_1\theta$ if the group does not use its veto; and by $-c$ if it does use the veto. Comparing these two expressions shows that group R vetoes $\pi_1 \neq 0$ if and only if

$$\pi_1 (2p_R - 1) \theta > c.$$

Note that – since $p_R < 1/2$ – the above condition requires both $\pi_1 = -1$ and $(1 - 2p_R) \theta > c$.

Group L 's policy proposal π_1 is determined as follows. Since the group still prefers reform policy *left*, it opts for $\pi_1 = -1$ (although this option is only weakly preferred if a veto is anticipated). Thus, to summarize, if $\Pi_0 = D_1 = 0$, we have

$$(\pi_1, v_1)|_{D_1=0} = \begin{cases} (-1, 1) & \text{if } (1 - 2p_R) \theta > c \\ (-1, 0) & \text{if } (1 - 2p_R) \theta \leq c \end{cases}. \quad (6)$$

4.1.2 Policy Reform in $t = 0$ ($\Pi_0 \neq 0$)

Updating beliefs. Suppose now that in $t = 0$ group L was able to implement one of the two reform policies (i.e, $\Pi_0 = D_1 \neq 0$). Then, after observing Y_0 , all individuals update their prior beliefs by using Bayes' rule. In what follows, we denote group i 's posterior belief about a , given Y_0 and Π_0 , by $\mu_i(a = -\theta | Y_0, \Pi_0)$. Bayes' rule implies

$$\mu_i(a = -\theta | Y_0, \Pi_0) = \frac{f(Y_0 | a = -\theta, \Pi_0) \cdot p_i}{f(Y_0 | a = -\theta, \Pi_0) \cdot p_i + f(Y_0 | a = \theta, \Pi_0) \cdot (1 - p_i)}, \quad (7)$$

where $f(\cdot | a = -\theta, \Pi_0)$ denotes the density function of the normally distributed random variable $Y_0|_{a=-\theta, \Pi_0}$ and $f(\cdot | a = \theta, \Pi_0)$ refers to the density function of $Y_0|_{a=\theta, \Pi_0}$. To save on notation, we henceforth stick to the following notation:

$$\mu_{i,-1} \equiv \mu_i(a = -\theta | Y_0, \Pi_0 = -1) \quad \text{and} \quad \mu_{i,+1} \equiv \mu_i(a = -\theta | Y_0, \Pi_0 = 1).$$

Policy left implemented in $t = 0$. If group L was able to implement its preferred policy in $t = 0$ (i.e, $\Pi_0 = D_1 = -1$), we have $Y_0|_{a=-\theta, \Pi_0=-1} \sim N(\theta, \sigma^2)$ and $Y_0|_{a=\theta, \Pi_0=-1} \sim N(-\theta, \sigma^2)$. Given this, and taking into account the functional form of the standard normal density, group i 's posterior belief $\mu_{i,-1}$ can be written as

$$\mu_{i,-1} = \frac{\exp(-(Y_0 - \theta)^2 / (2\sigma^2)) \cdot p_i}{\exp(-(Y_0 - \theta)^2 / (2\sigma^2)) \cdot p_i + \exp(-(Y_0 + \theta)^2 / (2\sigma^2)) \cdot (1 - p_i)}.$$

Assuming that agents maximize expected utility, it follows from (1) that it is crucial for group i 's attitude towards Π_1 whether or not $\mu_{i,-1}$ is greater than $1/2$. If this is the case, the group would like to stick to the implemented reform policy *left*; otherwise, it would prefer policy *right*. It is straightforward to check that $\mu_{i,-1} \geq 1/2$ is equivalent to

$$\frac{p_i}{1 - p_i} \frac{\exp(-(Y_0 - \theta)^2 / (2\sigma^2))}{\exp(-(Y_0 + \theta)^2 / (2\sigma^2))} \geq 1,$$

which, in turn, can be rearranged to obtain

$$Y_0 \geq -\ln\left(\frac{p_i}{1 - p_i}\right) \frac{\sigma^2}{2\theta} \equiv \underline{Y}_{i,-1}. \quad (8)$$

Note that $\underline{Y}_{i,-1}$ is decreasing in p_i so that $\underline{Y}_{L,-1} < \underline{Y}_{R,-1}$. Hence, the more optimistic a group's initial view on reform policy *left* is, the lower the realized level of output must be in order to make the group prefer the alternative reform policy in $t = 1$. Moreover, a higher degree of exogenous variation in the output variable (relative to the impact of a policy change, θ) amplifies the absolute difference between the two thresholds.

Consider now group R 's decision problem. It follows from (2) that the group's expected second-period consumption is given by $[\mu_R(-\theta) + (1 - \mu_R)\theta]\pi_1$ if it does not use its veto; and

by $[\mu_{R,-1}(-\theta) + (1 - \mu_{R,-1})\theta](-1)$ if it does use its veto (according to equation 5, vetoing a reversal of a reform is costless). As a result, we have $v_1 = 1$ if and only if

$$(1 + \pi_1)(2\mu_{R,-1} - 1)\theta > 0.$$

A necessary condition for a veto is thus that a policy change is proposed (i.e., $\pi_1 \neq -1$). Obviously, if there is no attempt to change policy, a veto does not have any effect and hence is not used. Moreover, there can only be a veto if $\mu_{R,-1} > 1/2$, i.e., if group R 's belief of the probability of $a = -\theta$ is greater than $1/2$ (instead of lower, according to the initial belief). This, in turn, requires $Y_0 \geq \underline{Y}_{R,-1}$.

We now turn to group L 's choice of π_1 . As discussed above, the group wants to revise its initial choice if $Y_0 < \underline{Y}_{L,-1}$. In this case, we have $\pi_1 = 1$, a decision that would not be vetoed later on by group R because $\underline{Y}_{L,-1} < \underline{Y}_{R,-1}$. In other words, if $Y_0 < \underline{Y}_{L,-1}$, both groups agree that reform policy *right* is appropriate (and *left* is a failure). Otherwise, if Y_0 exceeds the threshold $\underline{Y}_{L,-1}$, group L sticks to its initial policy choice (i.e., $\pi_1 = -1$) and, again, there will not be a veto since it would be without any effect. To summarize, we have

$$(\pi_1, v_1)|_{D_1=-1} = \begin{cases} (-1, 0) & \text{if } Y_0 \geq \underline{Y}_{L,-1} \\ (+1, 0) & \text{if } Y_0 < \underline{Y}_{L,-1} \end{cases}. \quad (9)$$

Policy *right* implemented in $t = 0$. Assume now that the policy implemented in $t = 0$ was the one preferred by group R (i.e., $\Pi_0 = D_1 = 1$). Then, we have $Y_0|_{a=-\theta, \Pi_0=1} \sim N(-\theta, \sigma^2)$. Using the functional form of the standard normal density in equation (7), and following an approach similar to the one above, we can find a condition for $\mu_{i,+1} \geq 1/2$:

$$Y_0 \leq \ln\left(\frac{p_i}{1-p_i}\right) \frac{\sigma^2}{2\theta} \equiv \bar{Y}_{i,+1}. \quad (10)$$

A posterior belief $\mu_{i,+1}$ greater than $1/2$ implies again that group i prefers policy *left* over policy *right*. However, since policy *right* was implemented in $t = 0$, $\mu_{i,+1} \geq 1/2$ means this time that group i prefers to change policy (from *right* to *left*) rather than to stick to it. Note that $\bar{Y}_{i,+1}$ is increasing in p_i so that $\bar{Y}_{L,+1} > \bar{Y}_{R,+1}$. Hence, the more optimistic a group's initial view on reform option *left* is, the higher the realized level of output must be in order to convince the group that option *right* has been the appropriate choice.

Group R 's expected second-period consumption is given by $[\mu_{R,+1}(-\theta) + (1 - \mu_{R,+1})\theta]\pi_1$ if it does not use its veto; otherwise, in the case of a veto, expected second-period consumption is simply $[\mu_{R,+1}(-\theta) + (1 - \mu_{R,+1})\theta]$. As a result, we observe a veto if and only if

$$(1 - \pi_1)(1 - 2\mu_{R,+1})\theta > 0.$$

As above, it is immediately clear that a veto will only be used if policies are proposed to change (i.e., $\pi_1 \neq 1$). Moreover, consistent with group R 's initial belief, $\mu_{R,+1}$ must be less than $1/2$ – which, in turn, requires $Y_0 > \bar{Y}_{R,-1}$.

Group L 's decision on π_1 depends on whether or not Y_0 is less than $\bar{Y}_{L,+1}$. If $Y_0 \leq \bar{Y}_{L,+1}$, the group proposes to change policy from *right* to *left* (i.e., $\pi_1 = -1$), a decision that will be vetoed later on by group R if $Y_0 > \bar{Y}_{R,-1}$. Otherwise, if $Y_0 > \bar{Y}_{L,+1}$, the incumbent sticks to policy *right* (i.e., $\pi_1 = 1$), a decision that does not trigger a veto because group R agrees (and, in any case, a veto would be ineffective). To summarize, we have

$$(\pi_1, v_1)|_{D_1=1} = \begin{cases} (-1, 0) & \text{if } Y_0 \leq \bar{Y}_{R,+1} < \bar{Y}_{L,+1} \\ (-1, 1) & \text{if } \bar{Y}_{R,+1} < Y_0 \leq \bar{Y}_{L,+1} \\ (+1, 0) & \text{if } \bar{Y}_{R,+1} < \bar{Y}_{L,+1} < Y_0 \end{cases} \quad (11)$$

4.2 First Period

4.2.1 Decision on the Veto

Regarding group R 's decision on v_0 , it is immediately clear that neither $\pi_0 = 0$ nor $\pi_0 = 1$ would trigger a veto. Vetoing these proposals would either be useless or against the group's own interest. However, if $\pi_0 = -1$, group R may want to block the proposed policy.

Opposition's payoff from policy *left*. The decisive factor for group R 's decision on whether or not to veto policy *left* is the expected payoff under its belief $p = p_R$. Suppose that group R does not use its veto. Then, taking into account the impact of today's decision on choices tomorrow (equation 9), group R 's expected overall utility is

$$E_R \{U_R | \pi_0 = -1, v_0 = 0\} = p_R \theta - (1 - p_R) \theta + \beta \theta \Delta_{R,-1}, \quad (12)$$

where the last term in (12) reflects group R 's valuation of policy experimentation and

$$\begin{aligned} \Delta_{R,-1} &= (2p_R - 1) + 2(1 - p_R) \Pr[Y_0 < \underline{Y}_{L,-1} | a = \theta, \Pi_0 = -1] \\ &\quad - 2p_R \Pr[Y_0 < \underline{Y}_{L,-1} | a = -\theta, \Pi_0 = -1]. \end{aligned} \quad (13)$$

Note that $\Delta_{R,-1}$ would take the simple form $\Phi(\theta/\sigma) - \Phi(-\theta/\sigma)$ if we had neutral and hence agreeing beliefs (i.e., $p_L = p_R = 1/2$), where Φ denotes the cumulative distribution function of the standard normal distribution. Clearly, in that case, $\Delta_{R,-1}$ would be strictly positive, reflecting the value of experimentation in a world with neutral priors. However, even then, $\Delta_{R,-1}$ would converge to zero as the variance of the exogenous shock goes to infinity: If σ is

large, Y_0 is a very noisy signal about a so that the expected payoff from experimentation is small. For the case of non-neutral and disagreeing beliefs, we have the following results:

Proposition 1 *Group R 's valuation of experimentation with reform policy left is given by $\beta\theta\Delta_{R,-1}$, where $\Delta_{R,-1}$ is (i) strictly decreasing in the variance of the exogenous shock, falling from 1 to $2p_R - 1 < 0$ as σ rises from 0 to infinity; (ii) and strictly decreasing in the degree of disagreement (i.e., it decreases as p_L rises or p_R falls).*

Proof. See Appendix A. ■

As in the case of neutral beliefs, a higher variance of the exogenous shock lowers the value of experimentation because Y_0 becomes a less informative signal. However, with non-neutral and disagreeing priors, group R 's valuation of policy experimentation decreases even more strongly. Group R anticipates that, the higher the variance of the shock, the less likely it will be that group L would ever revise its view about the appropriate reform (see equation 8).

A similar intuition explains the impact of stronger disagreement. The higher p_L , the less likely it becomes that group L will revise its view (see equation 8, again) and switch to policy *right*, i.e., to the policy group R thinks is appropriate ex ante. In addition, group R 's perceived value of experimentation decreases as p_R falls. The lower p_R , the higher the expected damage associated with sticking to the – from group R 's perspective – inappropriate policy *left*.

Decision on vetoing policy left. Having established group R 's payoff from policy experimentation, we can now determine under which circumstances policy *left* will be vetoed. Expected utility associated with $v_0 = 0$ is given by equation (12). On the other hand, if $v_0 = 1$, tomorrow's equilibrium decisions are characterized by equation (6) because there is no change to the default policy (i.e., $D_1 = 0$). In this case, expected utility can be expressed as

$$E_R \{U_R | \pi_0 = -1, v_0 = 1\} = \begin{cases} -(1 + \beta)c & \text{if } (1 - 2p_R)\theta > c \\ -c + \beta(2p_R - 1)\theta & \text{if } (1 - 2p_R)\theta \leq c \end{cases}. \quad (14)$$

For further use below, we establish the following result:

Lemma 1 *If opposition group R (weakly) prefers to veto reform policy left in $t = 0$, the group will strictly prefer to use its veto against left in $t = 1$.*

Proof. See Appendix A. ■

Obviously, if policy *left* is vetoed in $t = 0$, when there is still a possible future payoff from experimentation, the adoption of *left* must be prevented in the final period as well.

To describe the parameter constellation under which a veto against *left* arises, we define a function $\tilde{\sigma}_R(c)$, which, for given beliefs p_L and p_R , assigns to each c a value of σ such that

$$E_R \{U_R | \pi_0 = -1, v_0 = 0\} = E_R \{U_R | \pi_0 = -1, v_0 = 1\}. \quad (15)$$

In other words, if $\sigma = \tilde{\sigma}_R(c)$, group R is indifferent regarding the use of its veto in $t = 0$. Lemma 2 below characterizes the shape of the $\tilde{\sigma}(c)$ -function.

Lemma 2 *The function $\tilde{\sigma}_R(c)$ has the shape as shown in Figure 2a., i.e., it is strictly increasing from zero to infinity on the interval $[(1 - 2p_R - \beta)/(1 + \beta)\theta, (1 - 2p_R)\theta]$.*

Proof. See Appendix A. ■

Figure 2a. shows for which (c, σ) -combinations group R does (above the $\tilde{\sigma}_R$ -line) or does not (below the $\tilde{\sigma}_R$ -line) veto reform policy *left*, given p_L and p_R . Policy *left* passes if the executive is sufficiently strong (i.e., if the cost of a veto is sufficiently high) or if the variance of the exogenous shock is sufficiently low (i.e., if observing Y_0 is sufficiently informative).

Figure 2 here

4.2.2 Decision on Policy

We now move on to the last step, the determination of the policy proposal by group L . Since $p_L > 1/2$, the group prefers reform policy *left*. It is thus immediately clear that $\pi_0 = -1$ if this proposal will not be vetoed by group R . The situation is more involved, however, if group R is set to veto policy *left*. In this case, group L considers its expected utility under the alternative reform option: Because policy *right* would not be blocked, opting for $\pi_0 = 1$ would permit experimentation and learning. Therefore, and in particular if p_L is close to $1/2$ (i.e., if group L is “centrist”), group L may prefer policy *right* over political gridlock.

To find out, we have to derive $E_L \{U_L | \Pi_0 = 1\}$. Taking into account the impact of today’s decision on equilibrium choices tomorrow (equation 11), we obtain

$$E_L \{U_L | \Pi_0 = 1\} = -p_L\theta + (1 - p_L)\theta + \beta\theta\Delta_{L,+1}, \quad (16)$$

where $\Delta_{L,+1}$ is defined by equation (20) in Appendix A. The last term in (16) reflects group L ’s valuation of policy experimentation. The properties of $\Delta_{L,+1}$, which are stated in the following proposition, are similar to those of $\Delta_{R,-1}$:

Proposition 2 *Group L ’s valuation of experimentation with reform policy *right* is given by $\beta\theta\Delta_{L,+1}$, where $\Delta_{L,+1}$ is (i) strictly decreasing in the variance of the exogenous shock, falling*

from 1 to $1 - 2p_L < 0$ as σ rises from 0 to infinity; (ii) and strictly decreasing in the degree of disagreement (i.e., it decreases as p_L rises or p_R falls).

Proof. See Appendix A. ■

In anticipation of a veto against policy *left*, group L proposes *right* if $E_L \{U_L | \Pi_0 = 1\}$ is greater than zero, the overall utility associated with $\pi_0 \in \{-1, 0\}$, which follows from Lemma 1 and equation (6). Otherwise, the group opts for policy *left* (although this policy choice is only weakly preferred if a veto is anticipated). From Proposition 2, it follows that $E_L \{U_L | \Pi_0 = 1\}$ is decreasing in σ , with $E_L \{U_L | \Pi_0 = 1\} = \theta(1 - 2p_L + \beta)$ if $\sigma = 0$. As a result, there exists a strictly positive $\tilde{\sigma}_L$ such that $E_L \{U_L | \Pi_0 = 1\} = 0$ if and only if $1 - 2p_L + \beta > 0$, which is the case if p_L is sufficiently close to neutral and the future carries a sufficiently high weight. Assuming that $1 - 2p_L + \beta > 0$ holds, Figure 2b. illustrates for which (c, σ) -combinations group L prefers to propose policy *right* (below the $\tilde{\sigma}_L$ -line) rather than to opt for policy *left*.

4.2.3 Equilibrium and Discussion

Figure 3 combines the information provided in Figures 2a. and 2b. A solid line separates (c, σ) -combinations giving rise to a “gridlock equilibrium” from combinations leading to an “experimentation equilibrium”.¹¹ In the gridlock equilibrium (area above the solid line), group L proposes policy *left* in $t = 0$, a choice that is vetoed by group R . In formal terms, we have $\pi_0 = -1$ and $v_0 = 1$. Moreover, it follows from Lemma 1 and equation (6) that these choices are repeated in $t = 1$. Hence, in the gridlock equilibrium, reform attempts are repeatedly blocked, the default policy is in force in both periods, and learning is absent.

Figure 3 here

The situation is different in the experimentation equilibrium (area below the solid line). In $t = 0$, group L proposes either policy *left* (below the solid and the dashed lines) or policy *right* (between the solid and the dashed lines). In both cases, the group’s decision is not vetoed later on (i.e., we have either $(\pi_0, v_0) = (-1, 0)$ or $(\pi_0, v_0) = (1, 0)$). Because a reform policy is in fact implemented, agents are able to update their beliefs after observing Y_0 . As a result, the initial policy decision may be revised in $t = 1$. Decisions in this latter period are given by equation (9) if $\pi_0 = -1$ and by equation (11) if $\pi_0 = 1$.

¹¹The term “experimentation” is to be understood somewhat differently to, e.g., the context of microeconomic field experiments. In our case of a macroeconomic policy reform, there is no control treatment, and often cannot be (see, however, Xu, 2011, for a discussion of macroeconomic experiments in China, where some provinces are chosen as “treatment” group and non-treated provinces form the control group).

Figure 3 can also be used to characterize the circumstances under which the gridlock equilibrium may arise. Note first that the asymptote of the $\tilde{\sigma}_R$ -curve coincides with the y -axis if p_R is equal to $1/2$ (while the asymptote lies strictly to the right of the y -axis if $p_R < 1/2$). Hence, the gridlock equilibrium cannot exist in the limiting case $p_R = 1/2$. Regarding $\tilde{\sigma}_L$, observe that equation (16) and Proposition 2 imply $\lim_{\sigma \rightarrow \infty} E_L \{U_L | \Pi_0 = 1\} = 0$ if p_L is equal to $1/2$ (while this limit is strictly less than 0 if $p_L > 1/2$). Hence, in the limiting case $p_L = 1/2$, we have $\tilde{\sigma}_L \rightarrow \infty$ so that, once again, the gridlock equilibrium cannot exist. However, except for the cases in which (at least) one of the groups has neutral beliefs, Figure 3 shows that there always exist (c, σ) -combinations which give rise to the gridlock equilibrium.

Figure 4 here

Figure 4, finally, illustrates the situation for different degrees of disagreement. In Figure 4a., both p_L and p_R are relatively close to $1/2$ (“mild” disagreement). So $\tilde{\sigma}_L$ takes a comparatively high value and the asymptote of the $\tilde{\sigma}_R$ -curve is close to the y -axis. As a result, the set of (c, σ) -combinations giving rise to the gridlock equilibrium is small. In Figure 4b., p_L and p_R are closer to the polar values 1 and 0, respectively (“strong” disagreement). The “gridlock area” is therefore comparatively large. To summarize, we have the following results:

Proposition 3 *Assuming non-neutral and disagreeing beliefs (i.e., $p_L > 1/2$ and $p_R < 1/2$), there are two types of equilibria: Experimentation and gridlock. Whenever:*

- *c is sufficiently low and σ is sufficiently high (area above the solid line in Figure 3), the gridlock equilibrium emerges. This is an equilibrium in which the proposed reform policy is vetoed in both periods and, as a result, agents are unable to learn;*
- *c is sufficiently high and σ is sufficiently low (area below the solid line in Figure 3), the experimentation equilibrium emerges. This is an equilibrium in which a reform policy is adopted in $t = 0$ and, after the updating of beliefs, potentially revised in $t = 1$.*

A higher degree of disagreement (i.e., a higher value of p_L or a lower value of p_R) is associated with a larger “gridlock area”.

Proof. See the text above. ■

The main point of Proposition 3 is that disagreeing beliefs, through their impact on the political process, can lead to a paradoxical situation: Although everyone knows that a Pareto-improving reform does exist, decisions are taken that prevent the implementation of any reform. The consequence is that the economy is stuck in an “bad” equilibrium with sub-optimal policies

and a persistently strong disagreement. In other words, disagreeing beliefs undermine the very societal learning process that would narrow down disagreement over time.

Disagreement is bad for policy experimentation for two related reasons. First, from the perspective of the opposition, the reform option the incumbent wants to try first is the wrong one and hence expected to impose a short-term loss. Second, the opposition anticipates that the incumbent may stick the wrong policy even if – in the view of the opposition – a low realization of Y_0 mandated a reversal of the reform. Because of this low propensity to revisit an earlier decision, the opposition expects a low (or even negative) long-run payoff from experimentation, i.e., a payoff that may not cover the short-term loss. As a result, the opposition may be willing to spend resources on securing the status quo. A symmetric argument explains why the incumbent is reluctant to experiment with the opposition’s preferred policy option.

5 Disagreement and Economic Growth

We now characterize expected output growth and explore how it is affected by the primitives of the model. We do so from an impartial and ex ante point of view. This requires taking a stance on the appropriate belief about p , i.e., the belief adopted by an impartial rational agent.

5.1 Impartial Rational Beliefs

As noted earlier, achieving broad policy goals (like outward orientation or a more efficient allocation of credit) requires different measures in different countries. Whether a certain reform policy works in a particular country is often highly context-specific. Extrapolating from the experiences of other countries is therefore difficult and implementing reforms often means setting out for the unknown. We capture this prototypical situation by assuming that the parameter p is objectively unknown in the sense that the success probability of either of the two reform alternatives cannot be reliably judged based on existing evidence.

Treating p as an objectively unknown parameter requires us to specify how an impartial rational agent would come up with a prior belief regarding p . Following the principle of indifference (which goes back to Bayes and Laplace), we assume that an impartial rational agent would adopt a flat prior and treat p as being uniformly distributed over the range $[0, 1]$.¹² It is straightforward to show that this is equivalent to assuming $p = 1/2$. An important implication of taking a stance on the appropriate belief is that prior beliefs deviating from $p = 1/2$ are to

¹²In a setting with binary outcomes (success/failure) and no prior information, as is considered here, the flat prior is the only plausible candidate for an uninformative prior (see Geisser, 1984).

be seen as biased (e.g., as a result of overconfidence, as discussed above).

5.2 Economic Growth

We now turn to output growth as expected by an impartial rational agent at the beginning of period 0. The expectation operator E in the analysis below is thus to be understood from an ex-ante perspective and with respect to the impartial belief $p = 1/2$ (rather than p_L or p_R).

Expected growth. From equation (2), it follows that $EY_0 = 0$ since $p = 1/2$ from an impartial point of view. It is further clear from (2) that $EY_1 = E\{a\Pi_1\}$. Expected output growth is therefore given by $E\{Y_1 - Y_0\} = E\{a\Pi_1\}$. Clearly, this expectation depends on the nature of the equilibrium that emerges. Suppose first that the parameter constellation gives rise to the gridlock equilibrium (which involves $\Pi_0 = 0$). Then, Proposition 3 implies $\Pi_1 = 0$ and hence $E\{Y_1 - Y_0\} = 0$. On the other hand, if the parameter constellation gives rise to the experimentation equilibrium, we obtain the following results:

Proposition 4 *In the experimentation equilibrium, expected output growth is strictly positive.*

Using the definitions $z_i \equiv \ln(p_i/(1 - p_i))\sigma/(2\theta)$, $i \in \{L, R\}$, we obtain

$$E\{Y_1 - Y_0\} = \theta (\Phi(\theta/\sigma - z_L) - \Phi(-\theta/\sigma - z_L)) > 0 \quad (17)$$

if reform policy left is implemented in $t = 0$, and

$$E\{Y_1 - Y_0\} = \theta (\Phi(\theta/\sigma + z_R) - \Phi(-\theta/\sigma + z_R)) > 0 \quad (18)$$

if reform policy right is implemented in $t = 0$, where $\Phi(\cdot)$ denotes the cumulative distribution function of the standard normal distribution.

Proof. See Appendix A. ■

The fact that expected output growth is strictly positive mirrors that experimentation leads to learning about what type of reform policies work. While in $t = 0$ policy makers are “right” in only one half of the cases, the success probability is greater than $1/2$ in $t = 1$.

Determinants of expected growth. How is expected output growth affected by the primitives of the model? Our analysis suggests two basic correlations. First, assuming non-neutral beliefs, it predicts lower growth rates (on average) in economies that combine big exogenous shocks with low executive strength: If σ takes a sufficiently high, and c a sufficiently low value, the gridlock equilibrium prevails (Proposition 3), in which case expected output growth is zero;

otherwise, experimentation takes place, which implies positive growth in expectations (Proposition 4). An immediate corollary of this prediction is that developing or emerging economies are less likely to experience learning-driven growth: There is strong evidence that poorer countries are exposed to big exogenous shocks (e.g., Loayza, Rancière, Servén, and Ventura, 2007), not least because they specialize in volatile sectors (e.g., Koren and Tenreyro, 2007); at the same time, executives in poorer countries tend to be weak in the sense that low-capacity bureaucracies make it easy for dissenting groups to “throw off course” the implementation of politically approved reforms (e.g., Rauch and Evans, 2000; Huber and McCarty, 2004; Besley and Persson, 2009; Acemoglu, Ticchi, and Vindigni, 2011).

The second basic correlation suggested by our model is the one between disagreement and economic growth. Assuming a combination of “big” exogenous shocks and “low” executive strength, growth rates are predicted to be lower (on average) in economies that show more disagreement: If the political actors disagree strongly (i.e., if p_L and p_R are close to their polar values 1 and 0, respectively), the gridlock equilibrium prevails, growth is expected to be zero, and the level of disagreement is invariably high; otherwise, if there is little initial disagreement (i.e., if both p_L and p_R are close to $1/2$), experimentation takes place, growth is expected to be positive, and the gap in beliefs shrinks over time. Since mostly poorer countries combine big exogenous shocks and low executive strength, such a negative correlation between disagreement and growth should be primarily observed among developing and emerging economies. We do not know of any empirical study on the impact of disagreement on economic growth. However, the data presented in Section 2 indeed suggests a negative relationship in a cross-section of 58 developing and emerging economies.

Finally, it is interesting to explore how, in the experimentation equilibrium, expected output growth changes with the key parameters of the model:

Proposition 5 *In the experimentation equilibrium, expected output growth is:*

- *strictly decreasing in the magnitude of group L’s bias ($p_L - 1/2$) if reform policy left is implemented in $t = 0$; and strictly decreasing in the magnitude of group R’s bias ($1/2 - p_R$) if reform policy right is implemented in $t = 0$;*
- *strictly decreasing in the variance of the exogenous macroeconomic shock, σ .*

Proof. See Appendix A. ■

Stronger biases reduce growth because the two actors are less likely to draw the right conclusions from observing Y_0 . Suppose, for instance, that reform policy *left* is implemented in

$t = 0$. Then, the more biased group L 's belief, the less weight the group will give to a low Y_0 as a signal that policy *left* is a failure. Rather, group L will more often stick to its initial policy choice. This, in turn, lowers expected output growth under the objective belief $p = 1/2$. A similar intuition holds if policy *right* is implemented. A higher value of σ , by contrast, implies that observing Y_0 is less informative. As a result, there is less scope for learning and wrong decision are taken more often in $t = 1$.

6 Discussion and Conclusion

In its report “Learning from a Decade of Reform”, the World Bank (2005) emphasizes that the most successful developing countries tried different reform policies, thereby showing “a focused determination to adjust policies and institutions pragmatically (p.83)” as soon as they turned out to be inappropriate. Countries which did not show such a determination to experiment, learn, and adjust were less successful. But why might countries lack this important determination? The present paper emphasizes the role of disagreeing beliefs about the nature of successful reforms. If the view on policy differs substantially between the executive and the opposition, the latter fears that the reform policy proposed by the executive would remain in place even if – from the perspective of the opposition – the results turned out to be unsatisfactory and called for a reversal of the reform. The opposition may therefore perceive a negative long-run payoff from experimentation and thus be prepared to block the proposed deviation from the status quo. In our model, such a gridlock equilibrium leads to stagnation and, holding constant the level of disagreement, emerges whenever there is a combination of high exogenous volatility and low executive strength. There is clear evidence in the literature that this combination is characteristic of developing countries.

We further identify the extent of disagreement as an important determinant of the political equilibrium. In economies that combine high exogenous volatility and low executive strength, the gridlock equilibrium emerges whenever the extent of disagreement among the political actors is sufficiently high. As a result, our model suggests that stronger disagreement reduces an economy's growth prospects. It is interesting to observe that a negative correlations between GDP growth and a measure of disagreement (about key economic policies) can indeed be found in a cross-section of developing and emerging economies – even when controlling for the potentially confounding effects of heterogeneity in income or culture.

From a policy perspective, two implications stand out. First, investing in a developing country's statistical capacity to identify the sources of macroeconomic shocks (exogenous vs.

policy-induced) are likely to have a high payoff. For instance, investments with the aim to improve the system of national income accounts are not only likely to speed up the learning process associated with policy experimentation; such investments may also be important to avoid that a country gets stuck in a sclerotic political equilibrium, i.e., in an equilibrium where resources are wasted on saving the status quo and – as a consequence – experimentation and learning are entirely absent. Second, in a situation where the main political actors have strongly opposing views, there may be substantial payoffs from credibly communicating how little is often known *ex ante* about what type of reform policy will be successful. Doing so may reduce disagreement and hence help overcome political gridlock.

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APPENDIX A

Proof of Proposition 1. Using equations (2) and (8), and taking into account $\Pi_0 = -1$, the expression for $\Delta_{R,-1}$ given in equation (13) can be rewritten as

$$\Delta_{R,-1} = (2p_R - 1) + 2 \left((1 - p_R)\Phi(X^h) - p_R\Phi(X^l) \right), \quad (19)$$

where Φ denotes the cumulative distribution function of the standard normal distribution, $X^l \equiv -(\theta/\sigma) - \ln(p_L/(1 - p_L))\sigma/(2\theta)$, and $X^h \equiv (\theta/\sigma) - \ln(p_L/(1 - p_L))\sigma/(2\theta)$. Therefore,

$$\begin{aligned} \frac{d\Delta_{R,-1}}{d\sigma} &= 2(1 - p_R)\phi(X^h) \left[-\frac{\theta}{\sigma^2} - \ln\left(\frac{p_L}{1 - p_L}\right) \frac{1}{2\theta} \right] \\ &\quad - 2p_R\phi(X^l) \left[\frac{\theta}{\sigma^2} - \ln\left(\frac{p_L}{1 - p_L}\right) \frac{1}{2\theta} \right], \end{aligned}$$

where ϕ refers to the standard normal density. To determine the sign of this derivative, note the following: Because $X^h > X^l$ and the standard normal density is symmetric around zero, we have $\phi(X^h) > \phi(X^l)$; taking into account $p_R < 1/2$, one can further conclude that $(1 - p_R)\phi(X^h) > p_R\phi(X^l)$; finally, since $p_L > 1/2$, it is clear that the first term in square brackets (which is negative) is greater in absolute value than the second term in square brackets (which may be negative or positive). From this, $d\Delta_{R,-1}/d\sigma < 0$ follows.

Regarding the upper and lower bound of $\Delta_{R,-1}$, note first that the distribution of Y_0 is degenerate and $\underline{Y}_{L,-1} = 0$ if $\sigma = 0$. Hence, in this case, we have $\Pr[Y_0 < \underline{Y}_{L,-1} | a = \theta] = 1$ and $\Pr[Y_0 < \underline{Y}_{L,-1} | a = -\theta] = 0$. Using these results in (13), we find that $\Delta_{R,-1} = 1$. On the other hand, if $\sigma \rightarrow \infty$, both X^h and X^l approach minus infinity. As a result, for $\sigma \rightarrow \infty$, $\Phi(X^h)$ and $\Phi(X^l)$ approach 0 so that equation (19) implies $\Delta_{R,-1} = 2p_R - 1$.

Turning to how $\Delta_{R,-1}$ changes with beliefs, consider first

$$\frac{d\Delta_{R,-1}}{dp_R} = 2 - 2 \left(\Phi(X^h) + \Phi(X^l) \right).$$

This expression is strictly positive if and only if $\Phi(X^h) + \Phi(X^l) < 1$. To see that this is indeed the case, note first that $\Phi(X^h) + \Phi(X^l)$ is strictly increasing in both X^h and X^l . Observe further $X^h < (\theta/\sigma)$, $X^l < -(\theta/\sigma)$, and that $\Phi(\theta/\sigma) + \Phi(-(\theta/\sigma)) = 1$. From this, $\Phi(X^h) + \Phi(X^l) < 1$ follows immediately. Finally, consider

$$\frac{d\Delta_{R,-1}}{dp_L} = (p_R\phi(X^l) - (1 - p_R)\phi(X^h)) \frac{\sigma}{\theta p_L(1 - p_L)}.$$

As explained above, $\phi(X^h) > \phi(X^l)$. Moreover, since $p_R < 1/2$, we obtain $d\Delta_{R,-1}/dp_L < 0$.

Proof of Lemma 1. Suppose that, contrary to what is stated in the lemma, there exists an equilibrium in which $v_0 = 1$ is followed by $v_1 = 0$. In this case, we have $D_1 = 0$ so that equation (6) describes the equilibrium choices made in $t = 1$. Since v_1 is assumed to be 0, equation (6) implies $(1 - 2p_R)\theta \leq c$. Consider now $E_R\{U_R|\pi_0 = -1, v_0 = 1\} \geq E_R\{U_R|\pi_0 = -1, v_0 = 0\}$, i.e., the condition that must hold if $v_0 = 1$ is weakly preferred to $v_0 = 0$. Using equations (12) and (14), and the fact that $(1 - 2p_R)\theta \leq c$, this condition turns into

$$-c + \beta(2p_R - 1)\theta \geq (2p_R - 1)\theta + \beta\theta\Delta_{R,-1}.$$

Using the definition of $\Delta_{R,-1}$ given in equation (13), the above inequality can be rewritten as

$$\begin{aligned} (1 - 2p_R)\theta - c &\geq 2\beta\theta(1 - p_R) \Pr[Y_0 < \underline{Y}_{L,-1} | a = \theta, \Pi_0 = -1] \\ &\quad - 2\beta\theta p_R \Pr[Y_0 < \underline{Y}_{L,-1} | a = -\theta, \Pi_0 = -1]. \end{aligned}$$

Note that the right-hand side of the above condition must be strictly positive since $(1 - p_R) > p_R$ and $\Pr[Y_0 < \underline{Y}_{L,-1} | a = \theta, \Pi_0 = -1] > \Pr[Y_0 < \underline{Y}_{L,-1} | a = -\theta, \Pi_0 = -1]$. As a result, the left-hand side must also be strictly positive. But this is contradictory to $(1 - 2p_R)\theta \leq c$.

Proof of Lemma 2. By definition, if $\tilde{\sigma}(c) = \sigma$, group R is indifferent between $v_0 = 0$ and $v_0 = 1$. Hence, Lemma 1 implies that $E_R\{U_R|\pi_0 = -1, v_0 = 1\} = -(1 + \beta)c$. Note further that $E_R\{U_R|\pi_0 = -1, v_0 = 0\}$ depends on σ . If $\sigma = 0$, equation (12) and Proposition 1 imply that $E_R\{U_R|\pi_0 = -1, v_0 = 0\} = (2p_R - 1 + \beta)\theta$. In this case, the two expected utilities are equal if $c = (1 - 2p_R - \beta)\theta/(1 + \beta)$. Hence, $\tilde{\sigma}((1 - 2p_R - \beta)\theta/(1 + \beta)) = 0$, as shown in Figure 2. On the other hand, if $\sigma \rightarrow \infty$, equation (12) and Proposition 1 imply $E_R\{U_R|\pi_0 = -1, v_0 = 0\} = (1 + \beta)(2p_R - 1)\theta$. In this case, the two expected utilities are equal if $c = (1 - 2p_R)\theta$. Hence, $\lim_{c \rightarrow (1 - 2p_R)\theta} \tilde{\sigma}(c) = \infty$, as shown in Figure 2. Finally, note that

$$\frac{d\tilde{\sigma}}{dc} = -\frac{1 + \beta}{\beta\theta} \left(\frac{d\Delta_{R,-1}}{d\sigma} \right)^{-1},$$

where $d\Delta_{R,-1}/d\sigma < 0$ (Proposition 1). Hence, we have $d\tilde{\sigma}/dc > 0$.

Proof of Proposition 2. $\Delta_{L,+1}$ is given by

$$\begin{aligned} \Delta_{L,+1} &= (1 - 2p_L) + 2p_L \Pr[Y_0 < \bar{Y}_{R,+1} | a = -\theta, \Pi_0 = 1] \\ &\quad - 2(1 - p_L) \Pr[Y_0 < \bar{Y}_{R,+1} | a = \theta, \Pi_0 = 1]. \end{aligned} \tag{20}$$

To establish the properties of $\Delta_{L,+1}$, one can follow the approach taken in the proof of Proposition 1.

Proof of Proposition 4. Observing that a takes the two possible values $-\theta$ and θ with equal probability, an alternative way of writing $E\{Y_1 - Y_0\} = E\{a\Pi_1\}$ is

$$E\{Y_1 - Y_0\} = (1/2) \cdot (-\theta) \cdot E\{\Pi_1 | a = -\theta\} + (1/2) \cdot (\theta) \cdot E\{\Pi_1 | a = \theta\}. \quad (21)$$

Consider first a parameter constellation that leads to the adoption of policy *left* in $t = 0$. In this case, according to equation (9), we have $\Pi_1 = -1$ if $Y_0 \geq \underline{Y}_{L,-1}$ and $\Pi_1 = 1$ otherwise. As a result, the conditional expectations of Π_1 are given by, respectively,

$$E\{\Pi_1 | a = -\theta\} = \Pr[Y_0 \geq \underline{Y}_{L,-1} | a = -\theta] \cdot (-1) + \Pr[Y_0 < \underline{Y}_{L,-1} | a = -\theta] \cdot (1)$$

and

$$E\{\Pi_1 | a = \theta\} = \Pr[Y_0 \geq \underline{Y}_{L,-1} | a = \theta] \cdot (-1) + \Pr[Y_0 < \underline{Y}_{L,-1} | a = \theta] \cdot (1).$$

Inserting these two expressions into equation (21), and rearranging terms, yields

$$E\{Y_1 - Y_0\} = \theta (\Pr[Y_0 < \underline{Y}_{L,-1} | a = \theta] - \Pr[Y_0 < \underline{Y}_{L,-1} | a = -\theta]).$$

From this, we can derive equation (17) by observing $\Pr[Y_0 < \underline{Y}_{L,-1} | a = \theta] = \Phi(\theta/\sigma - z_L)$ and $\Pr[Y_0 < \underline{Y}_{L,-1} | a = -\theta] = \Phi(-\theta/\sigma - z_L)$, where $\Phi(\cdot)$ denotes the cumulative distribution function of the standard normal distribution and z_L is defined in the proposition. Since θ/σ is strictly positive, we conclude $E\{Y_1 - Y_0\} > 0$.

Suppose now that the parameter constellation leads to the adoption of policy *right* in $t = 0$. Then, according to equation (11), we have $\Pi_1 = -1$ if $Y_0 \leq \bar{Y}_{R,+1}$ and $\Pi_1 = 1$ otherwise. As a result, the conditional expectations of Π_1 are given by, respectively,

$$E\{\Pi_1 | a = -\theta\} = \Pr[Y_0 \leq \bar{Y}_{R,+1} | a = -\theta] \cdot (-1) + \Pr[Y_0 > \bar{Y}_{R,+1} | a = -\theta] \cdot (1)$$

and

$$E\{\Pi_1 | a = \theta\} = \Pr[Y_0 \leq \bar{Y}_{R,+1} | a = \theta] \cdot (-1) + \Pr[Y_0 > \bar{Y}_{R,+1} | a = \theta] \cdot (1).$$

By inserting these two expressions into equation (21), and by following a similar series of steps as above, one obtains equation (18). $E\{Y_1 - Y_0\}$ is again strictly positive because $\theta/\sigma > 0$.

Proof of Proposition 5. Suppose first that the parameter constellation gives rise to an experimentation equilibrium with policy *left* implemented in $t = 0$. Then, expected output growth is given by equation (17), and we obtain

$$\frac{\partial E\{Y_1 - Y_0\}}{\partial p_L} = \frac{\sigma}{2p_L(1 - p_L)} [\phi(-\theta/\sigma - z_L) - \phi(\theta/\sigma - z_L)],$$

where ϕ denotes the standard normal density. Since ϕ is symmetric around zero, we have $\phi(\theta/\sigma - z_L) > \phi(-\theta/\sigma - z_L)$ and hence $dE\{Y_1 - Y_0\}/dp_L < 0$.

Still assuming that policy *left* is implemented in $t = 0$, we further obtain

$$\begin{aligned} \frac{\partial E\{Y_1 - Y_0\}}{\partial \sigma} &= \theta \phi(\theta/\sigma - z_L) \left[-\frac{\theta}{\sigma^2} - \ln \left(\frac{p_L}{1 - p_L} \right) \frac{1}{2\theta} \right] \\ &\quad - \theta \phi(-\theta/\sigma - z_L) \left[\frac{\theta}{\sigma^2} - \ln \left(\frac{p_L}{1 - p_L} \right) \frac{1}{2\theta} \right]. \end{aligned}$$

Observe that the first term in square brackets (which is negative) is greater in absolute value than the second term in square brackets (which may be negative or positive). Given this, and taking into account $\phi(\theta/\sigma - z_L) > \phi(-\theta/\sigma - z_L)$, we find $dE\{Y_1 - Y_0\}/d\sigma < 0$.

Finally, if the parameter constellation gives rise to an experimentation equilibrium with reform policy *right* implemented in $t = 0$, expected output growth is given by equation (18). The signs of the partial derivatives in this case can be established in a similar way.

APPENDIX B

As pointed out in Section 3, this appendix characterizes the equilibrium that emerges if the cost of a veto does not depend on the history of economic reforms. More precisely, in this appendix, we assume that the cost of a veto in $t = 1$ is no longer given by equation (5) but instead simply by $c_1 = c_0 = c$. All other assumptions are unchanged.

Note first that group R 's expected overall utility associated with $(\pi_0, v_0) = (-1, 0)$, given by equation (12), is unaffected by this modification (and so is Proposition 1). The reason is that, independent of the value of c_1 , group R never uses its veto in $t = 1$ if policy *left* is implemented in $t = 0$. Hence, in this case, the expected overall utility cannot depend on the cost of a veto in $t = 1$. Note further that group R 's expected overall utility associated with $(\pi_0, v_0) = (-1, 1)$, given by equation (14), is also unaffected (and so is Lemma 1): Because of the veto against policy *left*, no reform is implemented in $t = 0$; hence, in this alternative case, equation (5) implies that $c_1 = c_0 = c$, as is assumed here. As a result, the function $\tilde{\sigma}_R(c)$, which is described in Lemma 2 and illustrated in Figure 2a., is unchanged.

While Figure 2a. is unaffected by the modification considered in this appendix, Figure 2b. is not. The reason is that we have a change to group L 's expected overall utility associated with implementing policy *right* in $t = 0$. More specifically, one can show that

$$E_L \{U_L | \Pi_0 = 1\} = -p_L \theta + (1 - p_L) \theta + \beta \theta \bar{\Delta}_{L,+1}, \quad (22)$$

where $\bar{\Delta}_{L,+1}$ denotes group L 's valuation of policy experimentation in this modified setup. One can further show that $\bar{\Delta}_{L,+1}$ is increasing in c if $c < \bar{c}$; and unaffected by c if $c \geq \bar{c}$, where

$$\bar{c} \equiv 2\theta \frac{p_L - p_R}{p_L + p_R - 2p_L p_R}.$$

The positive relationship at lower levels of c is due to the fact that the range of Y_0 -observations that make group R veto a proposed policy change in $t = 1$ narrows down as c increases. Put differently, a higher cost of a veto means that group L is more often in a position to implement its preferred policy in $t = 1$, a fact that is reflected in a higher valuation of policy experimentation. However, if the cost of a veto is sufficiently high (i.e., if c exceeds \bar{c}), group R will never use its veto in $t = 1$ so that c does no longer affect $\bar{\Delta}_{L,+1}$.

Figure 5 here

The fact that $E_L \{U_L | \Pi_0 = 1\}$ is no longer independent of c has consequences for the $\tilde{\sigma}_L$ -line shown in Figure 2b. Specifically, $\tilde{\sigma}_L$ (i.e., the level of σ below which group L chooses *right* in $t = 0$ if a veto against *left* is anticipated) is now increasing in c if $1 - 2p_L + \beta > 0$, as shown in Figure 5a. Otherwise, if $1 - 2p_L + \beta \leq 0$, such a $\tilde{\sigma}_L$ does not exist (as is the case in the version of the model discussed in the main part of the paper). Figure 5b., finally, is the modified version of Figure 3. It illustrates that the qualitative characterization of the equilibrium provided in Proposition 3 also applies to the model version considered here.

Table 1 – Motivating evidence: additional information

Panel A: Attitude questions from the World Value Survey

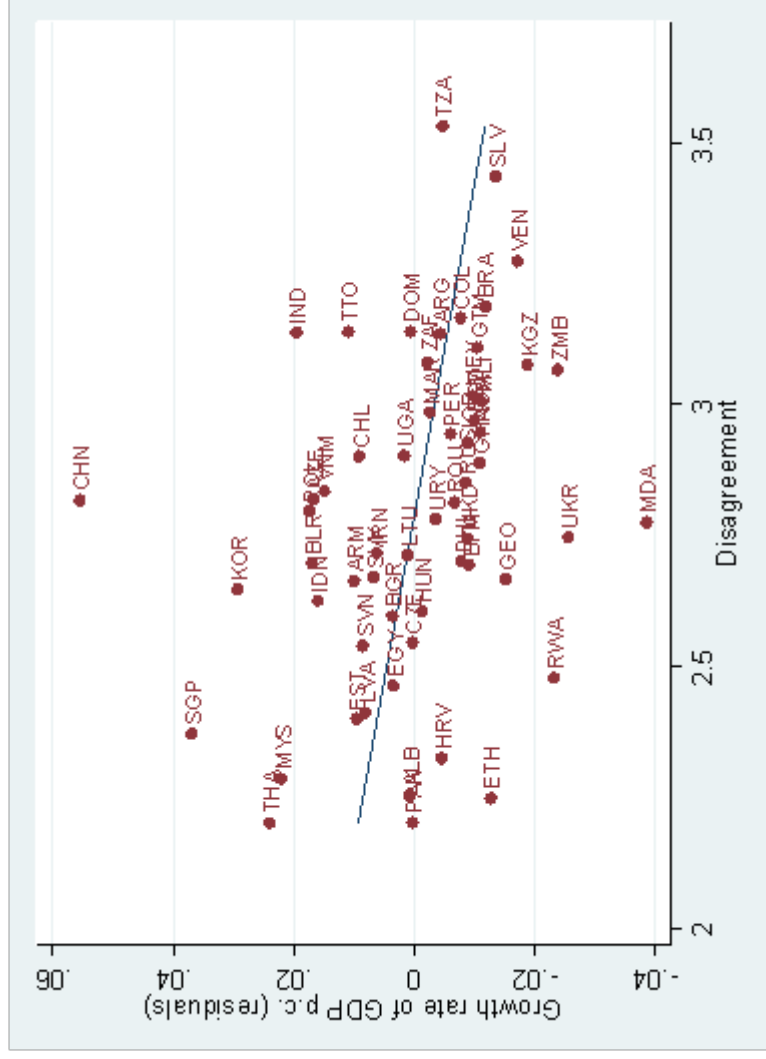
(i) Incomes should be made more equal vs. we need larger income differences as incentives for individual effort; (ii) Private ownership of business and industry should be increased vs. government ownership of business and industry should be increased; (iii) The government should take more responsibility to ensure that everyone is provided for vs. people should take more responsibility to provide for themselves; (iv) Competition is good, it stimulates people to work hard and develop new ideas vs. competition is harmful, it brings out the worst in people

Panel B: Countries in the regression sample

Albania, Argentina, Armenia, Azerbaijan, Bangladesh, Belarus, Brazil, Bulgaria, Burkina Faso, Chile, China, Colombia, Croatia, Czech Republic, Dominican Republic, Egypt, El Salvador, Estonia, Ethiopia, Georgia, Ghana, Guatemala, Hungary, India, Indonesia, Iran, Jordan, Kyrgyzstan, Latvia, Lithuania, Macedonia, Malaysia, Mali, Mexico, Moldova, Morocco, Nigeria, Pakistan, Peru, Philippines, Poland, Romania, Russian Federation, Rwanda, Singapore, Slovakia, Slovenia, South Africa, South Korea, Tanzania, Thailand, Trinidad and Tobago, Uganda, Ukraine, Uruguay, Venezuela, Vietnam, Zambia

Note: Panel A shows the four attitude questions from the World Value Survey (WVS) on which our proxy for disagreement is based. WVS asks respondents how much they agree or disagree with each of these four polar statements, using a 1-10 scale. We calculate the standard deviation of these answers separately for each question and then use the average standard deviation (across the four questions) as a proxy for disagreement. Panel B lists the 58 developing and emerging economies (i.e., countries that are not among the founding members of the OECD) which are included in our data.

Figure 1 – Disagreement and economic growth, 1980–2009



Note: This figure shows a partial regression plot. The underlying linear OLS regression relates average annual growth of GDP p.c. to a constant and four independent variables: (i) Our measure of disagreement; (ii) the Gini coefficient of the income distribution; (iii) an index of ethnolinguistic fractionalization; (iv) the log GDP p.c. in 1980. The value of the coefficient on disagreement (which equals the slope of the fitted line above) is -0.016 (p -value: 0.053).

Figure 2 – Veto and policy decisions in $t = 0$

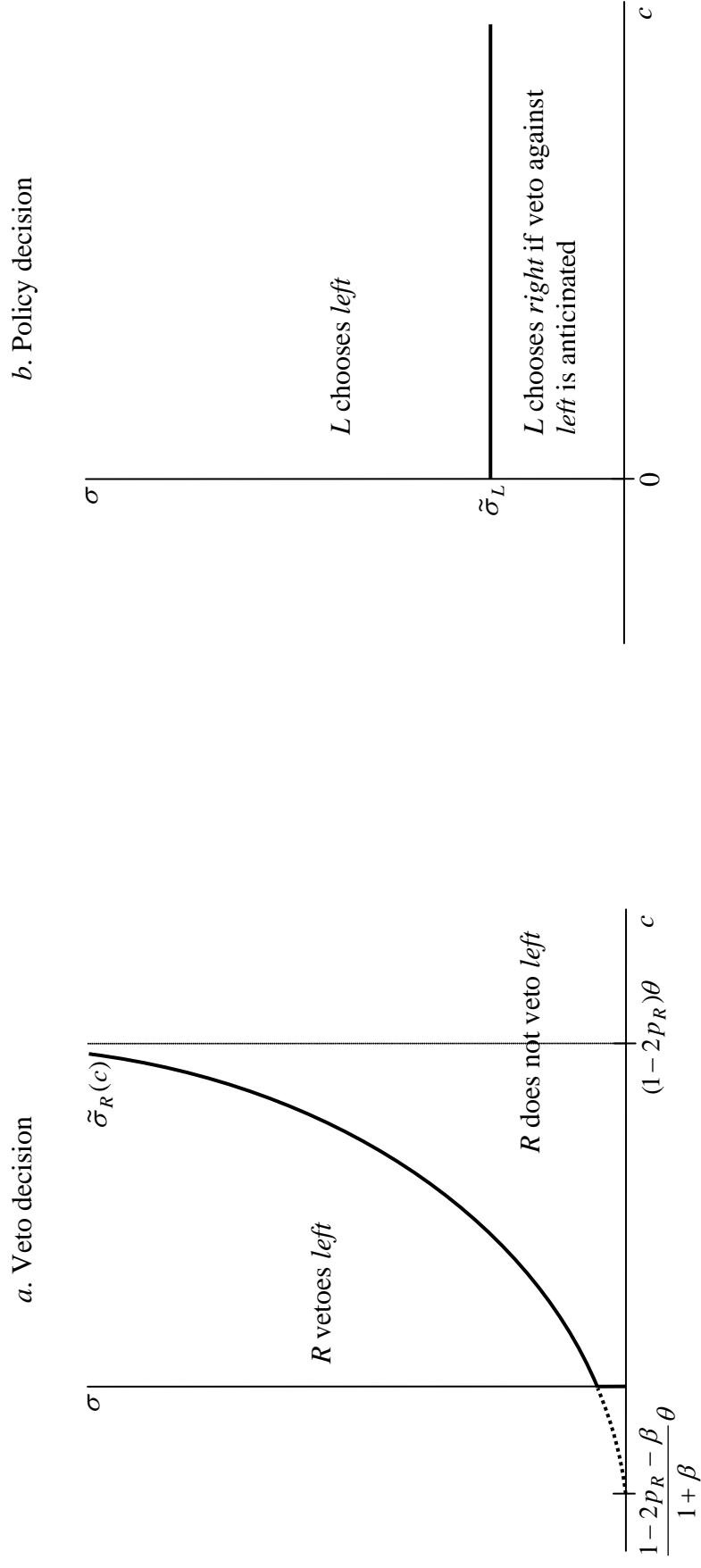


Figure 3 – Gridlock equilibrium vs. experimentation equilibrium

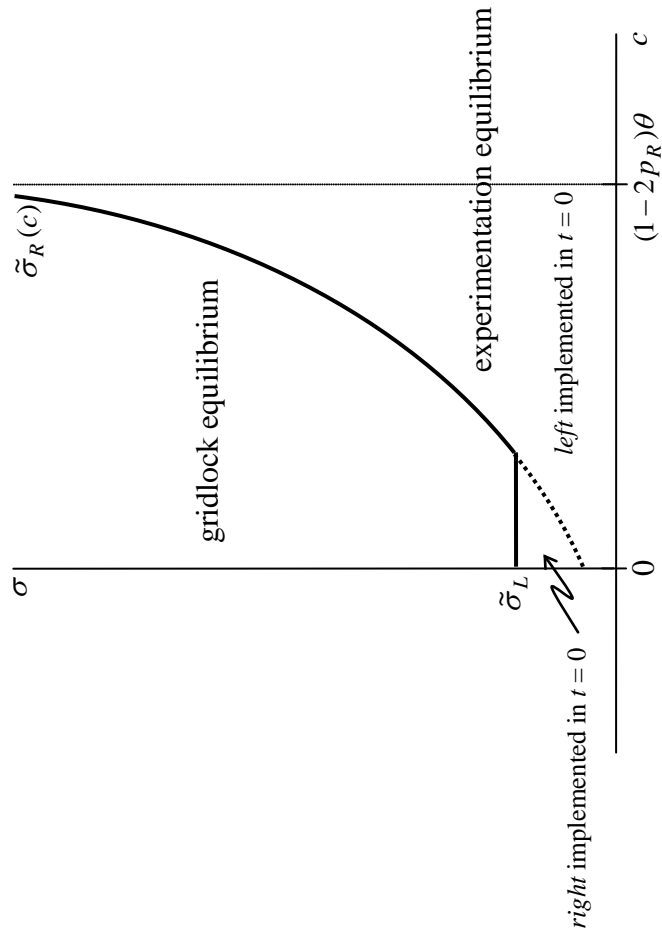


Figure 4 – “Mild” vs. “strong” disagreement

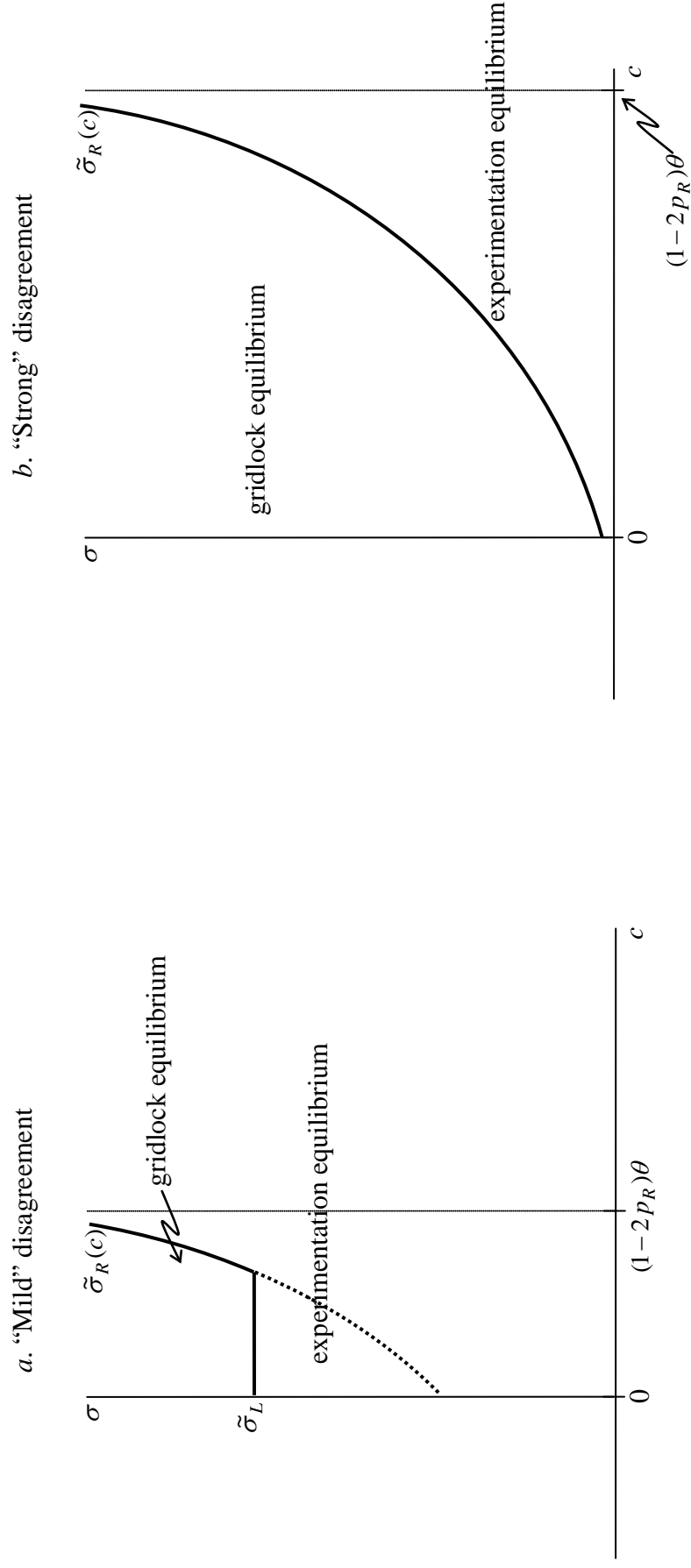


Figure 5 – Invariable veto cost (Appendix B)

